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(54) [Title of the Invention] METHOD OF, AND APPARATUS FOR,
MANAGING DEVICE OPERATION

(57) [Abstract]

[Object] To provide a method of, and an apparatus for, managing device operations, the method and the apparatus making it possible to effectively utilize functions of the devices and to enhance usability of the respective

devices.

[Solving Means] In a case where a peripheral device group (FPS) is constructed, functions of the respective devices are combined in accordance with an FPS construction request, then a new identification ID is assigned to a combined function thus combined, and the combined function and the new identification ID are registered in a memory (Steps S603 and S611). By this, a new peripheral device group is constructed in a multifunction peripheral device 2, and is virtually connected to a LAN 6. In a case where a function of a device on the LAN 6 is actually operated, a command is distributed to the device having the function corresponding to an identification ID, in accordance with a request for distributing the command from a user, the command including a content of a process and the identification ID, and thereby the device is caused to perform a process in accordance with the command (Steps S602 and S607 to S610).

[Scope of Claims]

[Claim 1] A method of managing device operations, which manages operation control of a plurality of devices, the method comprising the steps of:

storing identification IDs together with functions in a way that the identification IDs are associated with the respective functions, the plurality of devices including the functions, virtually constructing devices each including a combined function by combining the functions respectively of the plurality of devices, and storing new identification IDs together with the combined functions in a way that the new identification IDs are associated with the respective combined functions, the new identification IDs being respectively for identifying the combined functions included respectively by the virtually constructed devices;

accepting commands from a user, the commands designating at least the identification IDs;

identifying functions associated with the respective identification IDs

designated by the commands accepted in the accepting step; and

operating devices respectively including the functions identified in the identifying step, based on the accepted commands.

[Claim 2] The method of managing device operations as recited in claim 1, wherein the storing step stores different identification IDs together with individual functions of each of the combined functions in a way that the different identification IDs are associated with the respective individual functions, the devices virtually constructed in the storing step respectively including the combined functions, the different identification IDs being different from the identification IDs for identifying the functions included respectively by the plurality of devices.

[Claim 3] The method of managing device operations as recited in claim 2, wherein the different identification IDs are set up hierarchically in a way that the combined functions respectively included by the devices virtually constructed in the storing step are superordinate whereas the individual functions of each of the combined functions are subordinate.

[Claim 4] The method of managing device operations as recited in any one of claims 1 to 3, wherein the functions to be combined in the storing step are selected by the user.

[Claim 5] The method of managing device operations as recited in any one of claims 1 to 4, further comprising the step of deleting the devices virtually constructed in the storing step.

[Claim 6] The method of managing device operations as recited in any one of claims 1 to 5, wherein the storing step updates the functions included by the plurality of devices and the identification IDs for identifying the functions every time a change is made in the plurality of devices.

[Claim 7] The method of managing device operations as recited in any one of claims 1 to 6, wherein the plurality of devices are mutually connected through a network.

[Claim 8] The method of managing device operations as recited in any

one of claims 1 to 6, wherein the plurality of devices are configured in a single casing.

[Claim 9] The method of managing device operations as recited in any one of claims 1 to 8, wherein, in a case where there is a device including a plurality of functions out of the plurality of devices, the storing step virtually constructs a device including a part of the functions of the device, and stores a new identification ID for identifying the function together with the function in a way that the new identification ID is associated with the function included by the virtually constructed device.

[Claim 10] An apparatus for managing device operations, which manages operation control of a plurality of devices, the apparatus comprising:

storing means configured to store identification IDs together with functions in a way that the identification IDs are associated with the respective functions, the plurality of devices including the functions, virtually constructing devices each including a combined function by combining the functions respectively of the plurality of devices, and storing new identification IDs together with the combined functions in a way that the new identification IDs are associated with the respective combined functions, the new identification IDs being respectively for identifying the combined functions included respectively by the virtually constructed devices;

accepting means configured to accept commands from a user, the commands designating at least the identification IDs;

identifying means configured to identify functions associated with the respective identification IDs designated by the commands accepted by the accepting means; and

identifying means configured to operate devices respectively including the functions identified by the identifying means, based on the accepted commands.

[Claim 11] The apparatus for managing device operations as recited in claim 10, wherein the storing means stores different identification IDs together with individual functions of each of the combined functions in a way that the different identification IDs are associated with the respective individual functions, the devices virtually constructed by the storing means respectively including the combined functions, the different identification IDs being different from the identification IDs for identifying the functions included respectively by the plurality of devices.

[Claim 12] The apparatus for managing device operations as recited in claim 11, wherein the different identification IDs are set up hierarchically in a way that the combined functions respectively included by the devices virtually constructed by the storing means are superordinate whereas the individual functions of each of the combined functions are subordinate.

[Claim 13] The apparatus for managing device operations as recited in any one of claims 10 to 12, wherein the functions to be combined by the storing means are selected by the user.

[Claim 14] The apparatus for managing device operations as recited in any one of claims 10 to 13, further comprising deleting means configured to delete the devices virtually constructed by the storing means.

[Claim 15] The apparatus for managing device operations as recited in any one of claims 10 to 14, wherein the storing means update the functions included by the plurality of devices and the identification IDs for identifying the functions every time a change is made in the plurality of devices.

[Claim 16] The apparatus for managing device operations as recited in any one of claims 10 to 15, wherein the plurality of devices are mutually connected through a network.

[Claim 17] The apparatus for managing device operations as recited in any one of claims 10 to 15, wherein the plurality of devices are configured in a single casing.

[Claim 18] The apparatus for managing device operations as recited in

any one of claims 10 to 17, wherein, in a case where there is a device including a plurality of functions out of the plurality of devices, the storing means virtually constructs a device including a part of the functions of the device, and stores a new identification ID for identifying the function together with the function in a way that the new identification ID is associated with the function included by the virtually constructed device.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Pertains] The present invention relates to a method of, and an apparatus for, managing device operations, the method and the apparatus collectively managing control of operations of devices having various functions.

[0002]

[Prior Art] In addition to a single function peripheral device including a single function such as a printer, a scanner or a facsimile, a combined function peripheral device including a plurality of single functions and achieving a plurality of roles has been conventionally known. Moreover, in an office, these single function peripheral devices and/or combined function peripheral devices are connected to one another through a network, and concurrently a user interface is provided to intermediate between these devices and the user, thereby operations of the respective devices are managed. The user is able to operate the devices, which include desired functions, on the network through the user interface.

[Problems to be Solved by the Invention]

[0003] However, in the case of the above-described conventional technique of managing the device operations, each of the devices connected to the network is only able to offer a single function provided with the device. For example, a printer which is a single function peripheral device offers only a printing function. A combined function peripheral device including combined functions such as a printer function, a scanner function and a facsimile

modem function usually offers, in a single process, only one (for example, the scanner function) of the combined functions, or only a combination in a range of the combined functions (for example, a facsimile transmission function by combining the scanner function and the facsimile modem function).

[0004] Accordingly, there has been a limitation to utilization of the functions of the devices on the network. For example, at least the printer function and the scanner function are essential in a copy process, and even in a case where a printer device and a scanner device are connected to the network, a device including a copy function has been separately required in order to perform the copy process by a simple operation. Moreover, in a case where a monochrome copy machine and a color copy machine are connected to the network, a color copy process has had to be performed by the color copy machine, and has been unable to be performed by the monochrome copy machine.

[0005] As described above, there has been room for improvement to make effective use of the functions included in the single function peripheral devices and in the combined function peripheral devices, the devices being connected via the network, and to enhance utility of the respective devices.

[0006] Incidentally, it would be convenient if it is possible to obtain a new combined function by freely combining the functions of the devices on the network, or to achieve color copying with the monochrome copy machine, for example, by easily utilizing functions of devices on the network as resources for another device. However, in this case, it is necessary to consider not only identification management of the functions but also facilitation of a setting process for the functions at the same time.

[0007] Specifically, in the case of obtaining a new combined function by freely combining the functions of the devices on the network, one may consider the device including the combined function as a virtual combined function peripheral device. However, it becomes necessary to perform individual settings respectively for the functions which are constituents of

the combined function of this virtual combined function peripheral device. For example, in a case of constructing a single virtual printer by combining the monochrome printer and the color printer, it is necessary to perform an individual setting of the color printer for a color process and an individual setting of the monochrome printer for a monochrome process, respectively. Moreover, in the combined function peripheral device including the plurality of functions in a single casing from the beginning, conceivable cases include not only a case where the individual single functions included therein are independently performed, but also a case where a combined process is performed by arbitrarily combining the functions, as well as a case where the individual single functions are utilized independently by other devices. In those cases, in order to achieve optimal operations depending on aspects of utilization, it is necessary to identify the individual single functions not only as the single functions but also as part of the combined functions, depending on situations. Accordingly, it is necessary to perform individual settings respectively for the single functions depending on the aspects of utilization.

[0008] The present invention has been made in view of these points. An object of the present invention is to provide a method of, and an apparatus for, managing device operations, the method and the apparatus making it possible to more effectively utilize the functions of the devices, and to enhance utility of the respective devices.

[0009]

[Means for Solving the Problems] To attain the object, a method of managing device operations of claim 1 of the present invention is characterized in that the method includes the steps of: storing identification IDs together with functions in a way that the identification IDs are associated with the respective functions, the plurality of devices including the functions, virtually constructing devices each including a combined function by combining the functions respectively of the plurality of devices, and storing new identification IDs together with the combined functions in a

way that the new identification IDs are associated with the respective combined functions, the new identification IDs being respectively for identifying the combined functions included respectively by the virtually constructed devices; accepting commands from a user, the commands designating at least the identification IDs; identifying functions associated with the respective identification IDs designated by the commands accepted in the accepting step; and operating devices respectively including the functions identified in the identifying step, based on the accepted commands.

[0010] To attain the same object, the method of managing device operations of claim 2 of the present invention is characterized in that, in the configuration as recited in claim 1, the storing step stores different identification IDs together with individual functions of each of the combined functions in a way that the different identification IDs are associated with the respective individual functions, the devices virtually constructed in the storing step respectively including the combined functions, the different identification IDs being different from the identification IDs for identifying the functions included respectively by the plurality of devices.

[0011] To attain the same object, the method of managing device operations of claim 3 of the present invention is characterized in that, in the configuration as recited in claim 2, the different identification IDs are set up hierarchically in a way that the combined functions respectively included by the devices virtually constructed in the storing step are superordinate whereas the individual functions of each of the combined functions are subordinate.

[0012] To attain the same object, the method of managing device operations of claim 4 of the present invention is characterized in that, in the configuration as recited in any one of claims 1 to 3, the functions to be combined in the storing step are selected by the user.

[0013] To attain the same object, the method of managing device operations of claim 5 of the present invention is characterized in that, in the

configuration as recited in any one of claims 1 to 4, the method further includes the step of deleting the devices virtually constructed in the storing step.

[0014] To attain the same object, the method of managing device operations of claim 6 of the present invention is characterized in that, in the configuration as recited in any one of claims 1 to 5, the storing step updates the functions included by the plurality of devices and the identification IDs for identifying the functions every time a change is made in the plurality of devices.

[0015] To attain the same object, the method of managing device operations of claim 7 of the present invention is characterized in that, in the configuration as recited in any one of claims 1 to 6, the plurality of devices are mutually connected through a network.

[0016] To attain the same object, the method of managing device operations of claim 8 of the present invention is characterized in that, in the configuration as recited in any one of claims 1 to 6, the plurality of devices are configured in a single casing.

[0017] To attain the same object, the method of managing device operations of claim 9 of the present invention is characterized in that, in the configuration as recited in any one of claims 1 to 8, in a case where there is a device including a plurality of functions out of the plurality of devices, the storing step virtually constructs a device including a part of the functions of the device, and stores a new identification ID for identifying the function together with the function in a way that the new identification ID is associated with the function included by the virtually constructed device.

[0018] To attain the same object, an apparatus for managing device operations of claim 10 of the present invention is characterized in that the apparatus includes: storing means configured to store identification IDs together with functions in a way that the identification IDs are associated with the respective functions, the plurality of devices including the functions,

virtually constructing devices each including a combined function by combining the functions respectively of the plurality of devices, and storing new identification IDs together with the combined functions in a way that the new identification IDs are associated with the respective combined functions, the new identification IDs being respectively for identifying the combined functions included respectively by the virtually constructed devices; accepting means configured to accept commands from a user, the commands designating at least the identification IDs; identifying means configured to identify functions associated with the respective identification IDs designated by the commands accepted by the accepting means; and identifying means configured to operate devices respectively including the functions identified by the identifying means, based on the accepted commands.

[0019] To attain the same object, the apparatus for managing device operations of claim 11 of the present invention is characterized in that, in the configuration as recited in claim 10, the storing means stores different identification IDs together with individual functions of each of the combined functions in a way that the different identification IDs are associated with the respective individual functions, the devices virtually constructed by the storing means respectively including the combined functions, the different identification IDs being different from the identification IDs for identifying the functions included respectively by the plurality of devices.

[0020] To attain the same object, the apparatus for managing device operations of claim 12 of the present invention is characterized in that, in the configuration as recited in claim 11, the different identification IDs are set up hierarchically in a way that the combined functions respectively included by the devices virtually constructed by the storing means are superordinate whereas the individual functions of each of the combined functions are subordinate.

[0021] To attain the same object, the apparatus for managing device

operations of claim 13 of the present invention is characterized in that, in the configuration as recited in any one of claims 10 to 12, the functions to be combined by the storing means are selected by the user.

[0022] To attain the same object, the apparatus for managing device operations of claim 14 of the present invention is characterized in that, in the configuration as recited in any one of claims 10 to 13, the apparatus further includes deleting means configured to delete the devices virtually constructed by the storing means.

[0023] To attain the same object, the apparatus for managing device operations of claim 15 of the present invention is characterized in that, in the configuration as recited in any one of claims 10 to 14, the storing means update the functions included by the plurality of devices and the identification IDs for identifying the functions every time a change is made in the plurality of devices.

[0024] To attain the same object, the apparatus for managing device operations of claim 16 of the present invention is characterized in that, in the configuration as recited in any one of claims 10 to 15, the plurality of devices are mutually connected through a network.

[0025] To attain the same object, the apparatus for managing device operations of claim 17 of the present invention is characterized in that, in the configuration as recited in any one of claims 10 to 15, the plurality of devices are configured in a single casing.

[0026] To attain the same object, the apparatus for managing device operations of claim 18 of the present invention is characterized in that, in the configuration as recited in any one of claims 10 to 17, in a case where there is a device including a plurality of functions out of the plurality of devices, the storing means virtually constructs a device including a part of the functions of the device, and stores a new identification ID for identifying the function together with the function in a way that the new identification ID is associated with the function included by the virtually constructed device.

[0027]

[Embodiments for Carrying Out the Invention] Embodiments of the present invention will be explained below with reference to the drawings.

[0028] (First Embodiment) Fig. 1 is a block diagram showing a network configured by an apparatus for managing device operations according to a first embodiment of the present invention and peripheral devices controlled by the apparatus. In Fig. 1, reference numeral 1 denotes an operation unit for inputting various instructions from a user.

[0029] This apparatus for managing device operations is configured by a management control unit 4 and a memory 5 including a RAM and the like. Examples of single function peripheral devices are: a first single function peripheral device 7 (SFP#1) having a printer function; a second single function peripheral device 8 (SFP#2) having a scanner function; and a third single function peripheral device 9 (SFP#3) having a facsimile (FAX) modem function. The single function peripheral devices are mutually connected through a LAN 6 as communicating means, and are also connected to the management control unit 4 through the LAN 6. The operation unit 1 is also connected to the LAN 6.

[0030] A first peripheral device group 10 (FPS#4) and a second peripheral device group 11 (FPS#5) are combined function peripheral devices (hereinafter referred to as "peripheral device groups") each having a plurality of functions. However, these groups do not exist in reality, but are virtually constructed as described later, and are virtually connected to the LAN 6. Including these virtual peripheral device groups, the above-described three single function peripheral devices and this apparatus for managing device operations collectively constitute a multifunction peripheral device 2. However, the multifunction peripheral device 2 is also a virtual device. Moreover, although the operation unit 1 is logically connected to the management control unit 4 through a virtual interface 3, actual communications are carried out by the LAN 6.

[0031] As for the actually existing single function peripheral devices (such as the first single function peripheral device 7), unique identification IDs for respectively identifying the functions of the devices are assigned to the functions thereof, as described later. On the other hand, as for the peripheral device groups which do not actually exist (such as the first peripheral group 10), any one of the groups is virtually constructed on the LAN 6, for example, as a new device (a copy machine) having a combined function obtained by combining the function (the printer) of the first single function peripheral device 7 and the function (the scanner) of the second single function peripheral device 8. The second peripheral device group 11 is virtually constructed as a new device (a facsimile device) having a combined function obtained by combining the copy function (the scanner and facsimile functions) of the virtually constructed copy machine and the function (the facsimile modem function) of the third single function peripheral device 9. Then, new identification IDs are respectively given to those combined functions.

[0032] The management control unit 4 consists of a CPU, a RAM and the like. The management control unit 4 accepts various commands from a user through the operation unit 1, and concurrently controls operations of the functions of the single function peripheral devices and the peripheral device groups on the LAN 6 depending on the commands. A control program for the management control unit 4 is stored in the RAM. Moreover, the management control unit 4 stores the functions included by the devices on the LAN 6 and the identification IDs corresponding to the functions (this information on the functions and the identification IDs will be hereinafter referred to as "functional information") in the memory 5 in accordance with the user's instructions. Details of processes such as setting the identification IDs and registering/deleting the peripheral device groups will be described later.

[0033] Hereinafter, procedures of processes concerning the device operation

management by the apparatus for managing device operations according to the first embodiment will be described with reference to Figs. 2 to 5 for the respective processes, and with reference to a flowchart of Fig. 6 for the entire process.

[0034] Fig. 2 is a conceptual diagram showing a flow of a functional information disclosure process in the first embodiment. In Fig. 2, constituents identical to the constituents in Fig. 1 are denoted by the same reference numerals.

[0035] In order to investigate what kinds of functions are included in the multifunction peripheral device 2, the user transmits a functional information disclosure request from the operation unit 1 to the management control unit 4 through the virtual interface 3 (actually through the LAN 6 as described previously, and the same will apply hereinafter). The management control unit 4 extracts the functional information stored in the memory 5 and discloses the functional information to the user by transmitting the extracted functional information to the operation unit 1 through the virtual interface 3.

[0036] Fig. 3 is a conceptual diagram showing a flow of a command distribution process in the first embodiment. In Fig. 3, constituents identical to the constituents in Fig. 1 are denoted by the same reference numerals.

[0037] In order to actually utilize the functions in the multifunction peripheral device 2, the user transmits a command from the operation unit 1 to the management control unit 4 through the virtual interface 3. The command includes: the content of the process, namely, information indicating what kind of process is to be performed by use of the functions in the multifunction peripheral device 2 (such as detailed printing settings for the printer or transmission of printing data to the printer); and the identification ID, namely, information indicating to which function in the multifunction peripheral device 2 the process is to be performed. For

example, in a case where a copy process is desired to be performed by use of the first peripheral device group 10 which is the virtual device, the information indicating the copy process and the identification ID for the copy function in the first peripheral device group 10 are included in the command. [0038] The management control unit 4 transmits the command to the device having the function corresponding to the identification ID in the received command through the LAN 6. Upon receipt of the command, the device performs the process corresponding to the command, and returns a response to the management control unit 4 through the LAN 6 depending on necessity. The management control unit 4 returns this response to the operation unit 1 through the virtual interface 3. For example, in the case of performing the copy process by use of the first peripheral device group 10 which is the virtual device, the management control unit 4 actually controls the operations of the first single function peripheral device 7 and the second single function peripheral device 8 through the LAN 6, in a way that the devices 7 and 8 collaboratively perform the copy process. The management control unit 4 intermediates transmission and reception of the response, for example, transmission and reception of information on a sheet size usable in the copy process or information indicating completion or an error of the copy process. From the viewpoint of the user, this is recognized as if this copy process is performed by the operation of the first peripheral device group 10. [0039] Incidentally, in a case where there are a plurality of operation units, the management control unit 4 may be configured to establish sessions with the plurality of operation units. In this case, the management control unit 4 is required to manage to which operation unit the response for the received command is to be returned.

[0040] Fig. 4 is a conceptual diagram showing a flow of a process for constructing the virtual peripheral device group in the first embodiment. In Fig. 4, constituents identical to the constituents in Fig. 1 are denoted by the same reference numerals.

[0041] In order to construct a new peripheral device group having a combined function by combining the functions in the multifunction peripheral device 2, the user transmits a construction request for the peripheral device group (hereinafter referred to as an “FPS construction request”) from the operation unit 1 to the management control unit 4 through the virtual interface 3. This FPS construction request includes definition information indicating which functions are combined and what kind of combined function is realized. Incidentally, the functions to be combination targets are not limited to the functions (the single functions) of the actually existing devices but may also include the functions (the combined functions) of the peripheral device groups newly constructed by this constructing process for a peripheral device group.

[0042] The management control unit 4 newly constructs the peripheral device group having the a combined function in accordance with the received FPS construction request. The management control unit 4 assigns a new identification ID to the combined function, the new identification ID being different from the identification IDs assigned to the existing devices. The management control unit 4 stores, i.e., registers the combined function and the identification ID together in the memory 5, in a way that the combined function is associated with the identification ID. The management control unit 4 causes the user to recognize the fact that the peripheral device group is newly constructed and the combined function thereof by transmitting the identification ID of the combined function thus registered to the operation unit 1 through the virtual interface 3.

[0043] Fig. 5 is a conceptual diagram showing a flow of a process for deleting the virtual peripheral device group in the first embodiment. In Fig. 5, constituents identical to the constituents in Fig. 1 are denoted by the same reference numerals.

[0044] In order to delete the peripheral device group constructed in the process in Fig. 4, the user transmits a deletion request for the peripheral

device group (hereinafter referred to as a “FPS deletion request”) from the operation unit 1 to the management control unit 4 through the virtual interface 3. This FPS deletion request includes the identification ID corresponding to the function of the peripheral device group to be deleted.

[0045] The management control unit 4 deletes the functional information of the peripheral device group to be a deletion target, namely, the combined function and the identification ID corresponding to the combined function, from the memory 5.

[0046] Fig. 6 is a flowchart of the device operation management process by the apparatus for managing device operations according to the first embodiment. This process is performed by the management control unit 4.

[0047] This process is started by the user's start instruction from the operation unit. First, it is determined whether or not the user's instruction is a functional information disclosure request (Step S601). As a result of the determination, in a case where the user's instruction is not the functional information disclosure request, it is determined whether or not the user's instruction is a request for command distribution (Step S602). As a result of the determination, in a case where the user's instruction is not the request for command distribution, it is determined whether or not the user's instruction is an FPS (peripheral device group) construction request (Step S603). As a result of the determination, in a case where the user's instruction is not the FPS construction request, it is determined whether or not the user's instruction is the FPS deletion request (Step S604).

[0048] As a result of the determination, in a case where the user's instruction turns out to be the functional information disclosure request in Step S601, the functional information is extracted from the memory 5 (Step S605), and the extracted functional information is disclosed to the user by returning the information to the operation unit 1 (Step S606), and this process is terminated. By this, the user can recognize the functions of the devices existing either actually or virtually in the multifunction peripheral

device 2.

[0049] In a case where the user's instruction turns out to be the request for command distribution in Step S602, the device at the destination of the command distribution is identified by use of the identification ID included in the command (Step S607), then the command is distributed to the device (Step S608), then a response is received from the device which received the command (Step S609), then the response is transmitted to the operation unit 1 (Step S610), and this process is terminated. By this, the user can perform a desired process.

[0050] In a case where the user's instruction turns out to be the FPS construction request in Step S603, the functions of the respective devices are combined in accordance with the FPS construction request, then a new identification ID is assigned to the combined function thus combined, and the combined function and the new identification ID are registered in the memory 5 (Step S611). By this, the new peripheral device group is constructed in the multifunction peripheral device 2, and virtually connected to the LAN 6, thereby the device having the desired combined function can be realized. Next, this identification ID is transmitted to the operation unit 1 (Step S612), and this process is terminated. By this, the user can recognize the fact that the peripheral device group is newly constructed and the combined function thereof.

[0051] In a case where the user's instruction turns out to be the FPS deletion request as a result of the determination in Step S604, the functional information on the peripheral device group to be a deletion target is deleted from the memory 5 in accordance with the FPS deletion request (Step S613), and this process is terminated. This makes it possible to delete the virtual peripheral device group which becomes unnecessary.

[0052] On the other hand, in a case where the user's instruction turns out not to be the FPS deletion request as a result of the determination in Step S604, a process corresponding to the instruction is performed (Step S614),

and this process is terminated.

[0053] Fig. 7 is a diagram conceptually showing an aspect of formation of the identification IDs to be assigned to the respective devices in the first embodiment.

[0054] The identification IDs are hierarchically organized. The management control unit 4 is placed at the highest level (stage), and the lower levels are sequentially defined as a first level, a second level, and so on. As a whole, a tree structure is organized, with the management control unit 4 defined as a root. When setting the identification IDs, first, serial numbers are assigned to the functions of the devices at the first level as described below. A decimal point and another number are added to the corresponding number every time the level declines. In this case, by assigning an identification ID of an element constituting the function of the peripheral device group next to the decimal point, this function defined at a level of a hierarchy is distinguished from the same function in the single devices defined at a different level of the hierarchy. Specifically, a constituent of the function of the newly constructed device is represented by an identification ID subordinate to the identification ID of the original function. Incidentally, the function of the management control unit 4 is assigned with a special identification ID “0.”

[0055] The single function peripheral devices actually connected to the LAN 6 and the peripheral device groups virtually connected to the LAN 6 are included in the first level. Explanations corresponding to Fig. 1 are as follows. As the identification IDs, “1” is assigned to the function of the first single function peripheral device 7 (SFP#1), “2” is assigned to the function of the second single function peripheral device 8 (SFP#2), “3” is assigned to the function of the third single function peripheral device 9 (SFP#3), “4” is assigned to the function of the first peripheral device group 10 (SFP#4), and “5” is assigned to the function of the second peripheral device group 11 (SFP#5).

[0056] The elements constituting the functions of the peripheral device groups at the first level are included in the second level which is one stage lower. Explanations corresponding to Fig. 1 are as follows. As the identification IDs, "4. 1" is assigned to one constituent (the printer function of the first single function peripheral device 7), and "4. 2" is assigned to the other constituent (the scanner function of the second single function peripheral device 8), of the combined function of the first peripheral device group 10. In this way, even in the case of using the same printer function, different identification IDs are respectively assigned to the single printer function in the first single function peripheral device 7 and the printer function as one of the constituents of the copy function of the first peripheral device group 10. Accordingly, it is possible to distinguish both of the functions. Similarly, as the identification IDs, "5. 3" is assigned to one constituent (the facsimile modem function of the third single function peripheral device 9), and "5. 4" is assigned to the other constituent (the copy function of the first peripheral device group 10), of the combined function of the second peripheral device group 11.

[0057] The combined function of the first peripheral device group 10 to which the identification ID "5. 4" is assigned at the second level is actually the combination of the each of the functions of the first single function peripheral device 7 and the second single function peripheral device 8. Therefore, the constituents of the combined function of the first peripheral device group 10 to which the identification ID "5. 4" is assigned are included in the third level. Explanations corresponding to Fig. 1 are as follows. As the identification IDs, "5. 4. 1" is assigned to one constituent (the printer function of the first single function peripheral device 7), and "5. 4. 2" is assigned to the other constituent (the scanner function of the second single function peripheral device 8), of the combined function of the first peripheral device group 10 at the second level.

[0058] Incidentally, the information for identification to be assigned to the

functions is not limited to the conceptual hierarchical identification IDs as described above. In addition to functions as constituents of the combined function of the virtual devices, other kinds of information may be used, as long as the information is set up without overlapping. For example, in a command packet to be actually exchanged, various aspects of formation are conceivable such as "character strings" or "padding by use of numerical values."

[0059] As described above, the unique identification IDs are respectively assigned to the functions of the devices, and the new identification IDs are respectively assigned to the constituents of the functions of the devices, the new identification IDs being different from the identification IDs assigned to the functions as the single devices. Accordingly, it is possible to identify not only the functions of the devices (including the virtual devices) connected to the LAN 6, but also the functions of the constituents of the combined functions of the virtual devices separately from the functions of the single devices. Therefore, it is possible to perform individual settings depending on aspects of utilization of the respective functions. For example, it is possible to separately perform settings of the single scanner and the scanner function when used in the copy machine, and thereby to enhance utility.

[0060] Moreover, since the identification IDs are organized hierarchically, it is possible to securely avoid overlapping with other functions when setting the identification IDs, and thereby to perform identification management of the functions easily and reliably.

[0061] According to the first embodiment, it is a matter of course that the functions of the single function peripheral devices connected through the network can be performed individually. By freely combining the respective functions, it is also possible that the peripheral device groups having the combined functions are virtually obtained, that these combined functions are actually operated, and that the virtual devices having the combined functions are utilized as if they are actually existing devices. Moreover, it is

also possible to utilize the functions of the respective devices as additional functions (as sort of resources) of other devices. Therefore, it is possible to utilize the functions of the respective devices more effectively, and to enhance the utility of the respective devices.

[0062] Furthermore, it is possible to separately identify the functions as the single devices and the functions as part of the combined functions. Accordingly, it is possible to easily perform optimal settings depending on aspects of utilization of the respective functions, and this brings about convenience.

[0063] (Second Embodiment) Hereinafter, a second embodiment of the present invention will be described.

[0064] Fig. 8 is a block diagram showing an apparatus for managing device operations according to the second embodiment of the present invention and a multifunction peripheral device including the apparatus. The configuration of the apparatus for managing device operations according to the second embodiment is identical to the configuration of the apparatus for managing device operations according to the first embodiment which has already been described in Fig. 1. Specifically, this apparatus for managing device operations includes a management control unit 4 and a memory 5. It should be noted that constituents in Fig. 8 identical to the constituents in Fig. 1 are denoted by the same reference numerals.

[0065] In the case of the first embodiment, the single function peripheral devices and the peripheral device groups are connected through the network, and the multifunction peripheral device 2 is virtually constructed. By contrast, the second embodiment is different from the first embodiment in that a multifunction peripheral device 82 is constructed as a single casing which includes a plurality of existing devices.

[0066] The multifunction peripheral device 82 includes the management control unit 4, the memory 5, a first single function peripheral device 7, a second single function peripheral device 8, a third single function peripheral

device 9, a third peripheral device group 80, and a fourth peripheral device group 81. The first single function peripheral device 7, the second single function peripheral device 8, the third single function peripheral device 9, the third peripheral device group 80, and the fourth peripheral device group 81 are connected to one another through an internal bus 86, and are also connected to the management control unit 4. The internal bus 86 connects the respective devices not logically but physically, and actual communications are also carried out by use of this internal bus 86.

[0067] The third peripheral device group 80 and the fourth multifunction peripheral device 81 are existing peripheral devices having combined functions.

[0068] In the second embodiment, an aspect of formation of identification IDs is similar to that of the first embodiment. For example, constituents of combined function of the third peripheral device group 80 are assigned with identification IDs which are subordinate to identification ID of the combined function. Moreover, device operation management processes such as a functional information disclosure process, a command distribution process, a process for constructing a virtual peripheral device group, and a process for deleting the virtual peripheral device group are similar to those in the first embodiment.

[0069] According to the second embodiment, it is possible to obtain effects similar to the effects of the first embodiment, concerning the functions of the devices included in the multifunction peripheral device. For example, it is possible to identify the printer function of the first single function peripheral device 7 and the printer function in the copy function of the third peripheral device group 80 as separate functions, and to perform respective settings separately and easily.

[0070] Moreover, it is possible to standardize a configuration of applications for utilizing the functions of the virtual multifunction peripheral device 2 in the first embodiment and the existing multifunction peripheral device 82 in

the second embodiment. From the viewpoint of the user, it is not necessary to consciously discriminate the both devices.

[0071] In the first embodiment, it should be noted that the functions of the single function peripheral devices may not be limited to the constituents of one peripheral device group, and that the functions of the single function peripheral devices may be constituents of a plurality of peripheral device groups. Even in this case, since it is possible to perform different settings for each of the constituents of the combined functions of the different peripheral device groups, there is no inconvenience, and it is possible to further enhance the utility of the devices.

[0072] Incidentally, in Fig. 1 in the first embodiment, it also serves a purpose that the existing peripheral device group having the combined function is beforehand connected to the LAN 6, and that a virtual single function peripheral device having a part of the combined function of the peripheral device group is newly constructed on the LAN 6. In this way, it is possible to utilize the virtual device having a part of the functions of the device as if the virtual device is an independent device.

[0073] It should be noted that, in the second embodiment, as in the case of the first embodiment, a virtual peripheral device group may be constructed inside the casing of the multifunction peripheral device 82. In this case, the virtual peripheral device group may be constructed by use of combination with single functions existing outside the casing, in addition to combination with single functions inside the casing of the multifunction peripheral group 82.

[0074] It should be noted that similar effects can be achieved by configuring as follows: a control program expressed in the form of software for realizing the first and second embodiments of the present invention is stored in a storage medium such as a floppy disk (FD); and this control program is read from the storage medium and sent to the management control unit 4 of the apparatus for managing device operations. Alternatively, the control

program may be configured to be installable from a server.

[0075]

[Effects of the Invention]

As described above, according to the method of managing device operations as recited in the claim 1 of the present invention, or the apparatus for managing device operations as recited in claim 10 of the present invention, the following are achieved. The functions respectively included by the plurality of devices are respectively assigned with the identification IDs for identifying the functions, and the identification IDs are stored together with the functions in a way that the identification IDs are associated with the respective functions. In addition, the device having the combined function is virtually constructed by combining the functions respectively of the plurality of devices. The combined function included by the virtually constructed device is assigned with the new identification ID for identifying the combined function, and the new identification ID is stored together with the combined function in a way that the new identification ID is associated with the combined function. The commands designating at least the identification ID are accepted from the user. The functions respectively corresponding to the identification IDs designated by the accepted commands are identified. The devices respectively having the identified functions are operated based on the accepted commands. Accordingly, it is possible to utilize the functions of the devices more effectively, and to enhance the utility of the respective devices. In particular, it is possible to utilize the virtual device having the combined function as if the virtual device is an existing device.

[0076] According to the method of managing device operations as recited in the claim 2, or the apparatus for managing device operations as recited in claim 11, the individual functions of the combined functions included by the virtually constructed devices are assigned with the different identification IDs, which are different from the identification IDs for identifying the

functions included respectively by the plurality of devices, and the different identification IDs are stored together with the individual functions in a way that the different identification IDs are associated with the respective individual functions. Therefore, it is possible to recognize the functions of the single devices and the functions of the virtual devices having the combined functions as separate functions, and to separately perform setting processes and the like. Hence it is possible to further enhance the utility of the devices.

[0077] According to the method of managing device operations as recited in the claim 3, or the apparatus for managing device operations as recited in claim 12, the different identification IDs are set up hierarchically, in a way that the combined functions respectively included by the devices virtually constructed in the storing step are superordinate, and that the individual functions of each of the combined functions are subordinate. Therefore, it is possible to facilitate and ensure the function identification management.

[0078] According to the method of managing device operations as recited in the claim 7, or the apparatus for managing device operations as recited in claim 16, the plurality of devices are mutually connected through the network. Therefore, in particular, it is possible to utilize the functions of the single function peripheral devices and the multifunction peripheral device connected through the network more effectively, and thereby to enhance the utility of the respective devices.

[0079] According to the method of managing device operations as recited in the claim 8, or the apparatus for managing device operations as recited in claim 17, the plurality of devices are configured in the single casing. Therefore, in particular, it is possible to utilize the functions included in the multifunction peripheral device having the combined function more effectively, and thereby to enhance the utility of the respective devices.

[0080] According to the method of managing device operations as recited in the claim 9, or the apparatus for managing device operations as recited in

claim 18, in a case where there is a device having a plurality of functions out of the plurality of devices, a device having a part of the functions of the device is virtually constructed, and a function included by the virtually constructed device is stored together with a new identification ID for identifying the function, in a way that the new identification ID is associated with the function. Therefore, it is possible to utilize the functions of the devices more effectively, and to enhance the utility of the respective devices. In particular, it is possible to utilize the virtual device having a part of the functions of the device as if the virtual device is an existing independent device.

[Brief Description of Drawings]

[Fig. 1] Fig. 1 is a block diagram showing a network configured by an apparatus for managing device operations according to a first embodiment of the present invention and peripheral devices controlled by the apparatus.

[Fig. 2] Fig. 2 is a conceptual diagram showing a flow of a functional information disclosure process in the first embodiment.

[Fig. 3] Fig. 3 is a conceptual diagram showing a flow of a command distribution process in the first embodiment.

[Fig. 4] Fig. 4 is a conceptual diagram showing a flow of a process for constructing a virtual peripheral device group in the first embodiment.

[Fig. 5] Fig. 5 is a conceptual diagram showing a flow of a process for deleting the virtual peripheral device group in the first embodiment.

[Fig. 6] Fig. 6 is a flowchart of a device operation management process by the apparatus for managing device operations according to the first embodiment.

[Fig. 7] Fig. 7 is a diagram conceptually showing an aspect of formation of identification IDs to be assigned to the respective devices in the first embodiment.

[Fig. 8] Fig. 8 is a block diagram showing an apparatus for managing device operations according to a second embodiment of the present invention and a multifunction peripheral device including the apparatus.

[Explanations of Reference Numerals]

- 1 operation unit
- 2 multifunction peripheral device
- 3 virtual interface
- 4 management control unit
- 5 memory
- 6 LAN
- 7 first single function peripheral device
- 8 second single function peripheral device
- 9 third single function peripheral device
- 10 first peripheral device group
- 11 second peripheral device group
- 80 third peripheral device group
- 81 fourth peripheral device group
- 82 multifunction peripheral device
- 86 internal bus

Fig. 1

1 OPERATION UNIT
4 MANAGEMENT CONTROL UNIT
5 MEMORY
7 (PRINTER)
8 (SCANNER)
9 (FAX MODEM)
10 (COPIER) SCANNER + PRINTER
11 (FAX MACHINE) COPIER + FAX MODEM

Fig. 2

1 OPERATION UNIT
4 MANAGEMENT CONTROL UNIT
5 MEMORY
101 DISCLOSE FUNCTIONAL INFORMATION
102 REQUEST FUNCTIONAL INFORMATION DISCLOSURE
103 EXTRACT FUNCTIONAL INFORMATION

Fig. 3

1 OPERATION UNIT
4 MANAGEMENT CONTROL UNIT
101 RESPONSE
102 COMMAND
103 RESPONSE
104 COMMAND
105 DEVICE

Fig. 4

1 OPERATION UNIT
4 MANAGEMENT CONTROL UNIT

5 MEMORY
101 FPS IDENTIFICATION ID
102 REQUEST FPS CONSTRUCTION
103 REGISTER FPS INFORMATION

Fig. 5

1 OPERATION UNIT
4 MANAGEMENT CONTROL UNIT
5 MEMORY
101 REQUEST FPS DELETION
102 DELETE FPS INFORMATION

Fig. 6

101 DEVICE OPERATION MANAGEMENT PROCESS
S601 WHETHER IS IT FUNCTIONAL INFORMATION DISCLOSURE
REQUEST?
S602 WHETHER IS IT COMMAND DISTRIBUTION REQUEST?
S603 WHETHER IS IT FPS CONSTRUCTION REQUEST?
S604 WHETHER IS IT FPS DELETION REQUEST?
S605 EXTRACT FUNCTIONAL INFORMATION
S606 DISCLOSE FUNCTIONAL INFORMATION
S607 IDENTIFY DEVICE AT DESTINATION OF DISTRIBUTION
S608 DISTRIBUTE COMMAND
S609 RECEIVE RESPONSE
S610 TRANSMIT RESPONSE
S611 REGISTER
S612 TRANSMIT IDENTIFICATION ID
S613 DELETE FUNCTIONAL INFORMATION
S614 PERFORM PROCESS CORRESPONDING TO INSTRUCTION
102 END

Fig. 7

101 MANAGEMENT CONTROL UNIT (0)
102 FIRST LEVEL
103 SECOND LEVEL
104 THIRD LEVEL
105 FOURTH LEVEL
106 FOURTH LEVEL NUMBER
107 THIRD LEVEL NUMBER
108 SECOND LEVEL NUMBER
109 FIRST LEVEL NUMBER

Fig. 8

1 OPERATION UNIT
4 MANAGEMENT CONTROL UNIT
5 MEMORY
7 (PRINTER)
8 (SCANNER)
9 (FAX MODEM)
80 (COPIER)
81 (FAX TRANSMISSION)